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TECHNICAL MEMORANDUM

Date: November 15, 2016, revised July 24, 2017 and March 12, 2018

To: Scott Pruitt, Marissa Reed, U.S. Fish and Wildlife Service, Bloomington Field Office

From: Quintana Hayden, Cara Meinke, and Rhett Good, Western EcoSystems Technology, Inc. and Erin O'Shea and Christina Calabrese, EDP Renewables, North America

Subject: Revised Proposed Impact of Take Estimates and Mitigation Credit Calculations for the Headwaters Wind Farm Habitat Conservation Plan

BACKGROUND

The memo that follows describes the proposed impact of take estimates for the Covered Species (Indiana bat [*Myotis sodalis*] and northern long-eared bat [*Myotis septentrionalis*]) of the Headwaters Habitat Conservation Plan (HCP). The proposed mitigation credit calculation for the mitigation project for the Headwaters HCP is then described. The mitigation project is winter habitat protection: gating of Wind Cave in Kentucky.

IMPACT OF TAKE ESTIMATES

Indiana Bat

The Applicant estimates that a total of 9.55 Indiana bats will be taken each year during the 27-year ITP term. Approximately 75% of the incidental take is expected to be attributed to females, which would result in an annual female take of 7.16. Using the U.S. Fish and Wildlife Service's (USFWS') Region 3 Indiana Bat Resource Equivalency Analysis Model for Wind Energy Projects, Public Version 1 (USFWS 2016a) and a declining population, the total estimated lost reproductive capacity resulting from the Project is 308 Indiana bats, resulting in a total estimated impact of 501 Indiana bats over the life of the Project. This impact of take averages approximately 18.55 Indiana bats per year over the 27-year ITP term.

Northern Long-eared Bat

The Applicant estimates that a total of 2.53 northern long-eared bats will be taken each year during the 27-year ITP term. Approximately 50% of the incidental take is expected to be attributed to females, which would result in an annual female take of 1.26. Using the USFWS' Region 3 Northern Long-eared Bat Resource Equivalency Analysis Model for Wind Energy Projects, Public Version 1 (USFWS 2016b) and a declining population, the total estimated lost reproductive capacity resulting from the Project is 54 northern long-eared bats, resulting in a total estimated impact of 88 northern long-eared bats over the life

of the Project. This impact of take averages approximately 3.26 northern long-eared bats per year over the 27-year ITP term.

WIND CAVE GATING PROJECT

Wind Cave is a Priority 2 Indiana bat hibernaculum. In 2015, the cave was home to 2,878 Indiana bats (down from 3,537 observed in 2013). As many as 60 northern long-eared bats were also observed in the cave in 2013; however, subsequent acoustic monitoring conducted in 2015 revealed that northern long-eared bats are no longer present in the cave in any appreciable numbers. Other bat species known to use the cave include the little brown bat, tri-colored bat, eastern small-footed bat (*M. leibii*), big brown bat (*Eptesicus fuscus*), and Rafinesque's big-eared bat (*Corynorhinus rafinesquii*).

In terms of potential for human disturbance, the cave location is well-known to the public and the entrance is located near a road. The landowner who owns the cave has noted use of the cave by trespassers. It is highly likely that this use creates disturbance for hibernating Indiana bats since greater than 75% of the hibernating population of Indiana bats in the cave is clustered in low ceiling areas that are vulnerable to disturbance and/or predation. Therefore, the cave gating project will minimize the potential for Indiana and northern long-eared bats, if they return to the cave, to be negatively affected by potential vandalism in the future, providing an important conservation benefit for both species.

Indiana bats are known to migrate from hibernacula in Kentucky to summer habitat as far north as Michigan (Kurta 2004); therefore, it is likely that protection of winter habitat in Kentucky will benefit Indiana bats that establish maternity colonies in Indiana, or that migrate through Indiana. Due to the fact that Indiana bat populations are currently being decimated by WNS, protection of hibernacula from additional sources of stress is of the utmost importance. Wind Cave is considered by the USFWS Frankfort Field Office (USFWS FFO) and KDFWR to be the highest priority cave left to be gated in Kentucky.

The first cave gating phase consisted of pre-installation monitoring conducted in 2015. Direct impacts to bats could occur if bats collide with gate slats or have to expend extra energy to navigate around the gate structures. Due to this potential risk, a qualified bat biologist monitored the cave entrance with two thermal infrared cameras to identify bat flight paths and determined that the planned position of the gate in the cave is unlikely to impede the flight paths of bats or cause them to expend extra energy. Harp trapping conducted April 14, 2015 yielded three Indiana bats, one little brown bat, one eastern small-footed bat, and one tricolored bat. Dataloggers were also installed in fall 2015 to document temperature, humidity, and human usage of the cave prior to gating.

The second cave gating phase will consist of gate design and construction. The cave gate will be modeled after designs of other successful bat gates that have resulted in increased populations of Indiana bats (bat-friendly angle-iron). Spacing between gate beams will be sufficient to restrict human access to the cave, but not so tight as to impede bat flight through the gate or to result in collisions. The gate will be placed away from the entrance and not in the most constricted parts of the passage.

The following protective measures will be implemented during gate construction to minimize negative effects to bats:

- Gating will be conducted between May 15 and July 31, 2018, when the majority of bats will have moved to summer habitat.
- Since there is the potential for a small number of Indiana bats to use the cave during the period when gating would occur, the area in the vicinity of the planned gate installation will be inspected prior to construction activities to evaluate potential effects to non-migrating Indiana bats.
- If air flow is moving into the cave, an air curtain will be installed each day during construction to prevent exposure of bats roosting inside the cave to construction fumes.
- To prevent the spread of *Pseudogymnoascus destructans*, the current USFWS WNS decontamination protocol will be followed during gate construction.

Qualified biologists will be present during gate installation to provide assistance to the gating contractor and to ensure that protective measures are implemented.

The third cave gating phase will consist of development of a mitigation management plan(s) in collaboration with the USFWS and KDFWR that will include a monitoring and adaptive management plan. Monitoring will be conducted during the first three years of the mitigation project to provide the assurance that the gate was installed correctly and that it will function effectively through its operational life. In addition, Wind Cave will be regularly surveyed by the KDFWR on at least a biennial basis for the foreseeable future. However, if the KDFWR or the USFWS cannot continue their biennial monitoring efforts for any reason, EDPR will provide funding and personnel to continue biennial monitoring for the remainder of the ITP term. In such a case, at least one person with prior knowledge of the cave would be present during the first year of monitoring by EDPR-sponsored personnel.

EDPR will, in coordination with KDFWR, complete annual reports following each year of monitoring to be provided to the USFWS FFO and BFO. The reports will evaluate the effectiveness of the new gate in years 1-3 (i.e., evaluation at the time of installation to determine that bats are not impeded by the gate during their passage into and out of the cave) and in subsequent years the reports will discuss trends in bat populations and any signs of human visitation and make appropriate management recommendations to mitigate any issues discovered. To ensure that any required management actions can be implemented prior to the subsequent hibernation period, the mitigation monitoring report will be submitted annually by June 30.

Winter Habitat Protection Credit

The Applicant used the USFWS Region 3 Indiana Bat Resource Equivalency Analysis Model for Wind Energy Projects, Version 7 (USFWS 2016a) to calculate the Indiana bat credit for the proposed Wind Cave gating project. The following information was received from the Kentucky Department of Fish and Wildlife and the Kentucky Office of the USFWS to inform input parameters for the winter habitat protection module of the REA Model:

- Project start year – 2018

- Project end year – 2055
- N (population size of hibernaculum)- 2015 - 2,878 (down from 3,573 in 2013), MYSE present (1 observed)
- Evidence of WNS resiliency – No
- Evidence of non-disturbance threat - No
- Evidence of disturbance/vandalism - Yes
- Hibernaculum easily accessible- Yes
- Bats in accessible locations - Yes
- Low Ceiling - Yes
- Clumped or clustered - Yes
- Proportion of N in accessible locations - 75% or greater

Based on these inputs to the REA Model, protecting Wind Cave would result in credit for a total of 85 female Indiana bats.

Collectively, female take from the Project and lost reproductive capacity of females represents the annual loss of approximately 18.55 Indiana bats per year over the 27-year ITP. The winter mitigation action, therefore, will provide take coverage for 4.6 years (85 total Indiana bats gained / 18.55 Indiana bats per year taken = 4.6 years) of predicted impact of take for Indiana bats.

CONCLUSION

In summary, the Applicant estimates the following impact of take of the Covered Species and calculates the following mitigation credit, based on current USFWS guidance, for the proposed winter habitat mitigation project for the Headwaters HCP. The remaining impact of take will be offset by additional mitigation project(s) which will be identified and selected according to the criteria and schedule identified in the HCP.

Impact of take:

- 501 Indiana bats
- 88 northern long-eared bats

Mitigation credit:

- Winter habitat protection = 85 Indiana bats

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US Fish and Wildlife Service (USFWS). 2016a. Region 3 Indiana Bat Resource Equivalency Analysis Model for Wind Energy Projects: Public V1, December 2016. Bloomington, Indiana.

US Fish and Wildlife Service (USFWS). 2016b. Region 3 Northern Long-eared Bat Resource Equivalency Analysis Model for Wind Energy Projects: Public V1, December 2016. Bloomington, Indiana.